

# First report of *Artibeus bogotensis* Andersen, 1906 (Chiroptera: Phyllostomidae) for Peru

Wendy Calderón<sup>1\*</sup> and Victor Pacheco<sup>1,2</sup>

1 Universidad Nacional Mayor de San Marcos, Museo de Historia Natural, Departamento de Mastozoología. Apartado 14-0434, Lima-14, Peru.

2 Universidad Nacional Mayor de San Marcos, Facultad de Ciencias Biológicas. Lima, Peru.

\* Corresponding author: E-mail: [wcalderonsv@yahoo.es](mailto:wcalderonsv@yahoo.es)

**ABSTRACT:** *Artibeus bogotensis* (Phyllostomidae: Stenodermatinae) is reported for the first time for Peru. This record is based on the re-identification of a subadult female specimen collected at the Jenaro Herrera Research Center, District of Jenaro Herrera, Province of Requena, Department of Loreto, Peru. The comparative study between *Artibeus bogotensis* and other *Artibeus* species (*Artibeus glaucus* and *Artibeus anderseni*) was based on morphological and morphometric analyses. This noteworthy record means an expansion of its known distribution and, also, adds another bat species for Peru.

*Artibeus bogotensis* Andersen, 1906 was recognized as a full species by Lim *et al.* (2008), however, the taxonomic history of *A. bogotensis* is intertwined with *Artibeus cinereus* Gervais, 1856 and *Artibeus glaucus* Thomas, 1893. Initially, *A. bogotensis* was described as a larger size subspecies of *A. cinereus*, distributed from central Colombia to northwestern Venezuela (Andersen 1906, 1908), and the nominal subspecies *A. c. cinereus* recognized by Andersen (1906) was characterized by its smaller size and distribution, from northeast Venezuela through the Guianas to Pará, Brazil. The character used by Andersen (1906, 1908) to distinguish *A. cinereus* (including *bogotensis*) from *A. glaucus* was the absence or presence of m3 (lower third molar), respectively. Handley (1987), based on skull measurements, reassessed the taxonomic affinities of *bogotensis* and recommended its placement as a subspecies of *A. glaucus*.

Recently, Lim *et al.* (2008), based on morphological and molecular data, reexamined the status of *Artibeus glaucus bogotensis* and suggested the recognition of *A. bogotensis* as a full species, different from *A. cinereus* and *A. glaucus*.

According to Lim *et al.* (2008), *A. bogotensis* is restricted to northern South America including eastern Colombia (Andersen 1906; Allen 1916; Hershkovitz 1949; Handley 1987), Venezuela (Andersen 1908; Handley 1987; Ochoa *et al.* 1993; Ochoa 1995), Guyana (Thomas 1901; Smith and Kerry 1996; Lim and Engstrom 2000, 2001; Lim and Norman 2002), and Suriname (Lim *et al.* 2005), but absent from French Guiana (Sampaio *et al.* 2003; Martins *et al.* 2006), and Peru. However, a reexamination of one small *Artibeus*, deposited at the Museo de Historia Natural of the Universidad Nacional Mayor de San Marcos (MUSM), showed that this specimen (MUSM 1320) exhibits the characteristics described by Lim *et al.* (2008) for *A. bogotensis*, and prompted us to present this work as the first report of *A. bogotensis* for Peru. We also include morphological and morphometric data for this species.

Our specimen is a subadult captured in the Jenaro Herrera Research Center, Province of Requena, Department of Loreto, Peru, at ca. 130 m, by César Ascorra and consists of skin and skull in good condition. This specimen was previously identified as *Artibeus gnomus* Handley, 1987 (Ascorra *et al.* 1993). The CIJH is located on the right bank of the Ucayali River characterized by the presence of sandy soil of tertiary and quaternary alluvial sediments and different types of vegetation of upland forest and forest bajial (Spichiger *et al.* 1989). The canopy in this area reaches 25–30 meters, and average precipitation is approximately 2521 mm/year. (Ascorra *et al.* 1993; Gorchoy *et al.* 1995).

The specimen MUSM 1320 was compared with 33 specimens of *A. bogotensis* used by Lim *et al.* (2008), from different localities in the northern Neotropics (Appendix 1). We took 17 measurements based on Velazco and Simmons (2011) that are shown in Table 1. These variables are: forearm length (FA); greatest length of skull (GLS); condyloincisive length (CIL); condylocanine length (CCL); braincase breadth (BB); zygomatic breadth (ZB); postorbital breadth (PB); palatal width at canines (C-C); mastoid breadth (MB); Palate length (PL); maxillary toothrow length (MTRL); molariform toothrow length (MLTRL); width of skull at M1 (M1-M1); width of skull at M2 (M2-M2); dentary length (DENL); mandibular toothrow length (MANDL); and coronoid height (COH).

This study reports the first record of *A. bogotensis* for Peru, extending the distribution of this species at least 500 km southward from the closest locality (Figure 1), and adding one more bat species to the currently 168 known from Peru (Pacheco *et al.* 2009; Lim *et al.* 2010; Velazco and Cadenillas 2011, Velazco *et al.* 2011).

This specimen has the external and cranial characteristics described for *A. bogotensis* (Marques-Aguiar 2008; Lim *et al.* 2008): bicolored hair, contrasting white facial lines above and below the eyes, white edge on



ears, and short dorsal hairs which do not extend beyond the posterior edge of the interfemoral membrane (Figure 2). *Artibeus glaucus* has indistinct facial lines, indistinct white edge on ears, and longer dorsal hairs which extend beyond the posterior edge of the interfemoral membrane. Our specimen also has a short face, an orbitorostral region mildly developed, narrow postorbital region, and no third (Figure 3). The absence of the third lower molar and the dorsal hairs not extending beyond the posterior edge of the interfemoral membrane are shared with *Artibeus anderseni* Osgood, 1916, which also presents rostrum usually elevated anteriorly, and frontal region of skull rounded (Marques-Aguiar 2008).

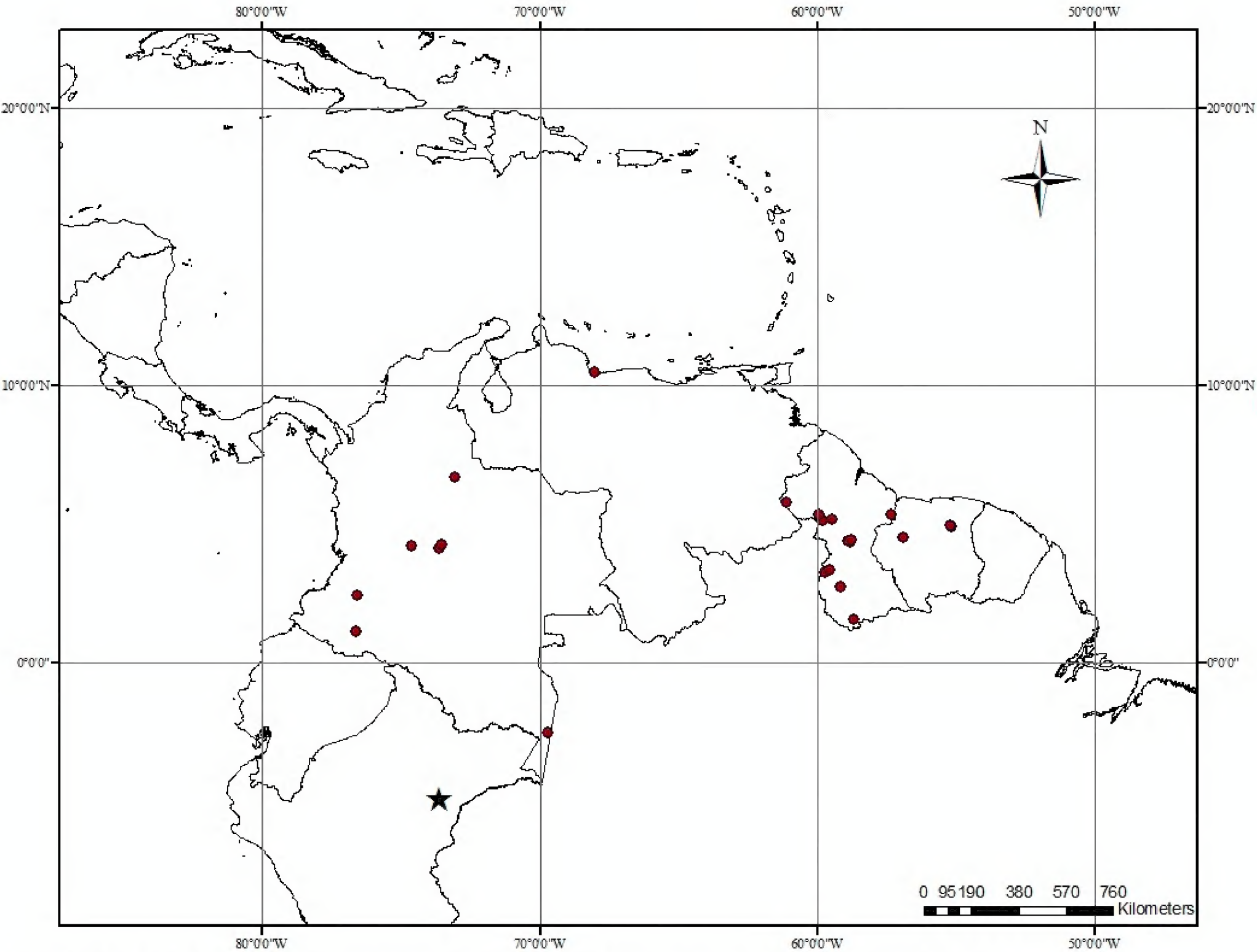
Lim *et al.* (2008) stated that the postorbital region of the skull of *A. bogotensis* is narrow, but re-examining the specimens we concluded that this feature exhibits variability. Furthermore, we found that the concavity located between the mandibular condyle and the angular process is more pronounced in *A. bogotensis*, with the angular process acquiring a sharp and elongated appearance (Figure 4). In *A. glaucus* the curvature is less developed, resulting in a short and rounded angular process also observed in *A. anderseni* (Figure 4).

Our specimen of *A. bogotensis* (MUSM 1320) is smaller in some variables presented by Lim *et al.* (2008). For example, in our specimen the variables GLS, MB, MTRL and COH are smaller than the range of variation presented

by Lim *et al.* (2008) for this species (Table 1). We had expected this smaller size in some variables due to our specimen being a subadult.

**TABLE 1.** Measurements of the new record from Peru of *Artibeus bogotensis* (MUSM 1320), specimens from Lim *et al.* (2008), and specimens from four countries (Colombia, Venezuela, Guyana and Suriname) reviewed in this study.

MEASURES	THIS STUDY	LIM <i>et al.</i> (2008) (39)	THIS STUDY (33)
FA	37.4	-	39.91±1.4 (37.11-41.8)
GLS	19.16	20.2±0.4 (19.5-21.0)	20.38±0.4 (19.42-21.08)
CIL	16.6	-	18.09±0.4 (17.36-18.99)
CCL	16.09	-	17.52±0.4 (16.61-18.22)
BB	8.44	-	9.09±0.2 (8.59-9.57)
ZB	10.86	11.5±0.4 (10.7-12.3)	11.67±0.3 (10.99-12.24)
PB	5.01	5±0.2 (4.7-5.3)	5.05±0.1 (4.79-5.62)
C-C	5.49	5.3±0.2 (4.9-5.7)	5.27±0.2 (4.78-5.71)
MB	9.03	10.3±0.2 (9.7-10.7)	9.63±0.2 (9.22-10.03)
PL	3.97	-	4.32±0.1 (4.03-4.79)
MTRL	5.89	6.4±0.2 (6.1-6.8)	6.39±0.2 (5.98-6.98)
MLTRL	5.04	-	5.58±0.1 (5.14-6.11)
M1-M1	7.95	-	8.18±0.5 (5.8-8.99)
M2-M2	7.82	-	8.08±0.2 (7.58-8.78)
DENL	11.08	-	12.3±0.3 (11.7-13.19)
MANDL	6.37	-	7±0.2 (6.6-7.93)
COH	4.37	5.3±0.3 (4.8-5.9)	5.28±0.2 (4.85-5.75)

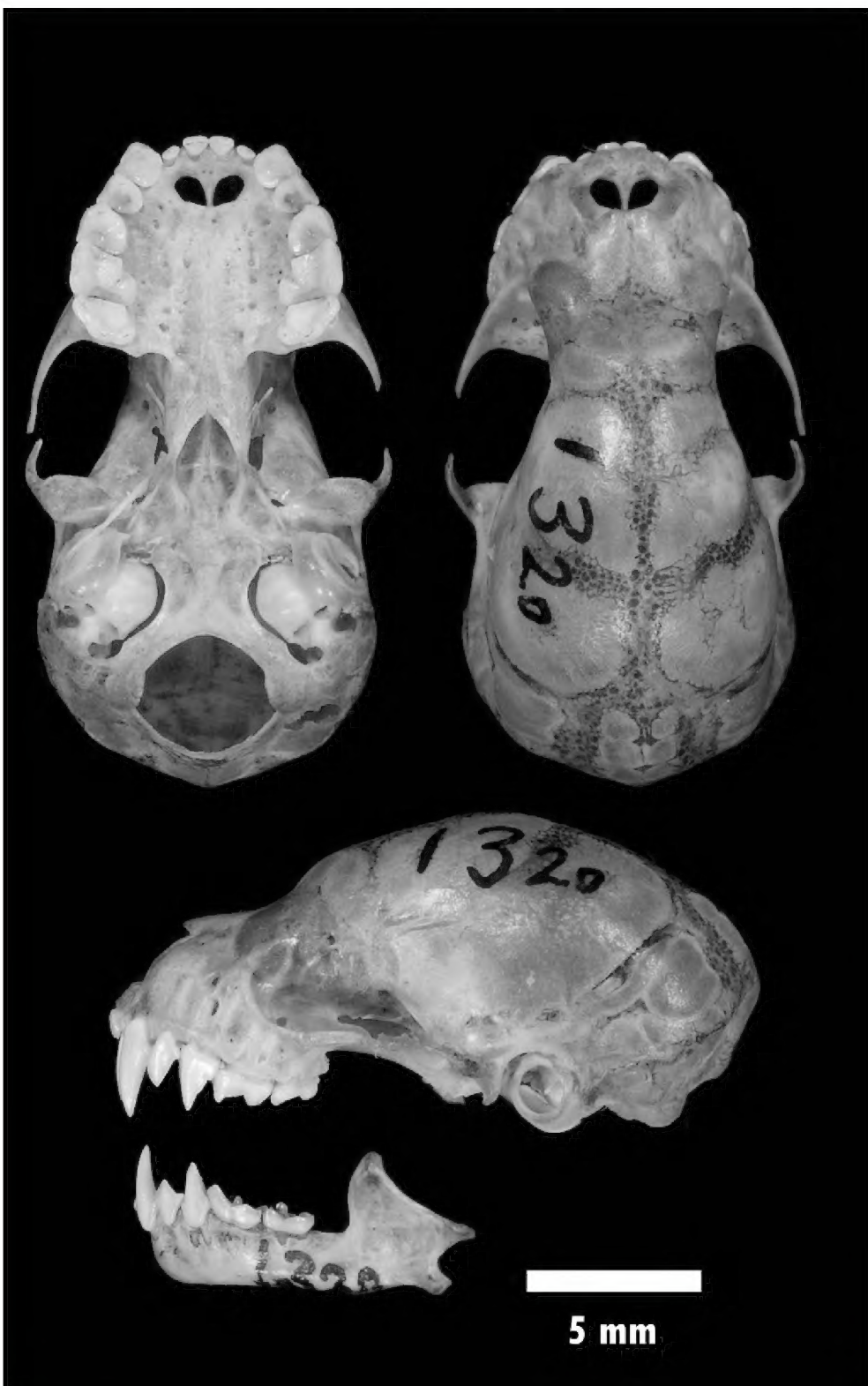


**FIGURE 1.** Map of distribution in South America of *Artibeus bogotensis* (circles), including the new record for Peru (star).





**FIGURE 2.** Skin of *Artibeus bogotensis*, illustrating the white lines above and below the eyes, and the white edge of the ears.



**FIGURE 3.** View of the skull of *Artibeus bogotensis* (MUSM 1320).



**FIGURE 4.** Note the difference of the concavity between the mandibular condyle and the angular process. Above: *Artibeus bogotensis* (MUSM 1320), in the center *Artibeus glaucus* (MUSM 16369), and below *Artibeus anderseni* (MUSM 20425).

**ACKNOWLEDGMENTS:** We are grateful to César Ascorra for capturing this specimen at the Jenaro Herrera Research Center; to the American Museum of Natural History (AMNH) Collection Study Grant and the Richard Gilder Graduate School for the financial support to the senior author, and to Burton Lim (ROM) for the loan of specimens used in this study. We also want to thank Rob Voss and Paul Velazco for their great support at the AMNH, and for all their useful recommendations for this paper. To our colleagues Carlos Jiménez, Edgardo Rengifo and José Serrano for their support elaborating this paper. Finally, we would also like to thank the family Velazco-Kline, for their generous hospitality while the senior author was in New York City, USA.

#### LITERATURE CITED

- Allen, J.A. 1916. List of mammals collected in Colombia by the American Museum of Natural History Expeditions, 1910–1915. *Bulletin of American Museum of Natural History* 35: 191–238.
- Andersen, K. 1906. Brief diagnosis of a new genus and ten new forms of stenodermatous bats. *Annals and Magazine of Natural History* 7 (18): 419–423.
- Andersen, K. 1908. A monograph of the chiropteran genera *Uroderma*, *Enchisthenes* and *Artibeus*. *Proceedings of the Zoological Society* 1908: 204–319.
- Ascorra, C.F., D.L. Gorchov and F. Cornejo. 1993. The bats from Jenaro Herrera, Loreto, Peru. *Mammalia* 57 (4): 533–552.
- Gorchov, D.L., F. Cornejo, C. Ascorra and M. Jaramillo. 1995. Dietary overlap between frugivorous birds and bats in the Peruvian Amazon. *OIKOS* 74: 235–250.
- Handley, C.O., Jr. 1987. New species of mammals from northern South America: Fruit-eating bats, genus *Artibeus* Leach. *Studies in Neotropical mammalogy: Essays in honor of Philip Hershkovitz. Fieldiana Zoology* 39: 163–172.
- Hershkovitz, P. 1949. Mammals of northern Colombia, preliminary report no. 5: bats (Chiroptera). *Proceedings of the United States National Museum* 99: 429–454.
- Lim, B.K. and M.D. Engstrom. 2000. Preliminary survey of bats from the upper Mazaruni of Guyana. *Chiroptera Neotropical* 6: 119–123.
- Lim, B.K. and M.D. Engstrom. 2001. Bat community structure at Iwokrama Forest, Guyana. *Journal of Tropical Ecology* 17: 647–665.



- Lim, B.K. and Z. Norman. 2002. Rapid assessment of small mammals in the eastern Kanuku Mountains, Lower Kwitaro River area, Guyana; p. 51-58 *In* J.R. Montambault and O. Missa (ed.). *A biodiversity assessment of the eastern Kanuku Mountains, Lower Kwitaro River, Guyana*. Arlington: Conservation International, RAP Bulletin of Biological Assessment 26.
- Lim, B.K. and M.D. Engstrom. 2005. Mammal of Iwokrama Forest. *Proceedings of the Academy of Natural Sciences of Philadelphia* 154: 71-108.
- Lim, B.K., M.D. Engstrom, J.C. Patton and J.W. Buckram. 2008. Systematic review of small fruit-eating bats (*Artibeus*) from the Guianas and a re-evaluation of *A. glaucus bogotensis*. *Acta Chiropterologica* 10(2): 243-256.
- Lim, B.K., M.D. Engstrom, F.A. Reid, N.B. Simmons, R.S. Voss and D.W. Fleck. 2010. A new species of *Peropteryx* (Chiroptera: Emballonuridae) from western Amazonia with comments of phylogenetic relationships within the genus. *American Museum Novitates* 3686: 1-20.
- Marques-Aguiar, S.A. 2008. Genus *Artibeus* Leach, 1821; p. 301-321. *In* A.L. Gardner (ed.). *Mammals of South America: Marsupials, Xenarthrans, Shrews, and Bats*. Chicago: The University of Chicago Press.
- Martins, A.C.M., E. Bernard and R. Gregorin. 2006. Inventários biológicos rápidos de morcegos (Mammalia, Chiroptera) em três unidades de conservação do Amapá, Brasil. *Revista Brasileira de Zoologia* 23: 1175-1184.
- Ochoa, G.J. 1995. Los mamíferos de la región de Imataca, Venezuela. *Acta Científica Venezolana* 46: 274-287.
- Ochoa, G.J., C. Molina and S. Giner. 1993. Inventario y estudio comunitario de los mamíferos del Parque Nacional Canaima, con una lista de las especies registradas para la Guayana Venezolana. *Acta Científica Venezolana* 44: 245-262.
- Pacheco, V., R. Cadenillas, E. Salas, C. Tello and H. Zeballos. 2009. Diversity and endemism of Peruvian mammals. *Revista Peruana de Biología* 16(1): 5-32.
- Sampaio, E.M., E.K.V. Kalko, E. Bernard, B. Rodríguez-Herrera and C.O. Handley-Jr. 2003. A biodiversity assessment of bats (Chiroptera) in a tropical lowland rainforest of Central Amazonia, including methodological and conservation considerations. *Studies on Neotropical Fauna and Environment* 38: 17-31.
- Smith, P.G. and S.M. Kerry. 1996. The Iwokrama Rain Forest Programme for sustainable development: how much of Guyana's bat (Chiroptera) diversity does it encompass? *Biodiversity and Conservation* 5: 921-942.
- Spichiger, R., J. Méroz, P.A. Loizeau and L. Stutz de Ortega. 1989. Contribución a la flora de la Amazonía peruana. Los árboles del Arborétum Jenaro Herrera. *Boissiera* 1 (43):1-360.
- Thomas, O. 1901. On a collection of bats from Para. *Annals and Magazine of Natural History* 8(7): 408-410.
- Velazco, P.M. and R. Cadenillas. 2011. On the identity of *Lophostoma silvicolum occidentale* (Davis & Carter, 1978) (Chiroptera: Phyllostomidae). *Zootaxa* 2962: 1-20.
- Velazco, P.M. and N.B. Simmons. 2011. Systematic and taxonomy of Great Striped-Faced bats of the Genus *Vampyroides* Thomas, 1900 (Chiroptera: Phyllostomidae). *American Museum Novitates* 3710: 1-35.
- Velazco, S., V. Pacheco and A. Meschede. 2011. First occurrence of the rare emballonurid bat *Cyttarops alecto* (Thomas, 1913) in Peru-Only hard to find or truly rare?. *Mammalian Biology* 76(2011): 373-376.
- APPENDIX 1.** Specimens revised. The following list includes all specimens examined in this study and those used by Lim *et al.* (2008) (which are marked with an asterisk), with their respective locations, from the following collections: MUSM (Museum of Natural History at the Universidad Nacional Mayor de San Marcos, Lima, Perú), ROM (Royal Ontario Museum, Toronto, Canada), CM (Carnegie Museum of Natural History, Pittsburgh, Pennsylvania).
- Artibeus bogotensis*.** **COLOMBIA:** Amazonas; Tarapacá, 2°32' S, 69°44' W (ROM 53687\*). Cauca; Popayán, 2°27' N, 76°36' W (ROM 46384). Cundinamarca; 2 Km. S of Pacho, Finca La Riseta, 5°8' N, 74°8' W (ROM 51851, 51852). Meta; Restrepo, 4°15' N, 73°33' W (ROM 53602\*); Villavicencio, 4°9' N, 73°37' W (ROM 53609). Putumayo; Guascayaco, 1°9' N, 76°37' W (ROM 49221). Santander; Aratoca, 6°42' N, 73°3' W, 1500 m. (ROM 84990). Tolima, Melgar, 4°12' N, 74°39' W, 323 m. (ROM 53608\*). **VENEZUELA:** Bolívar; 3 km. E of Puerto Cabello del Caura, 5°20' N, 57°20' W (ROM 107907\*, 107942\*). Carabobo; 25 Km. E of Puerto Cabello, 10°29' N, 68°2' W (ROM 62284, 62285). **GUYANA:** Cuyuni-Mazaruni; Namai Creek, 5 Km. W of Paruima, 5°48' N, 61°6' W, 800 m. (ROM 108169\*, 108176, 108222). Potaro-Siparuni; Iwokrama Forest, 30 km. NE of Surama, 4°20'N, 58°51'W, 70 m (ROM 97989\*), Cowfly Camp, 4°20' N, 58°49' W, 80 m. (ROM 108516, 108658, 108659, 108722), Gorge Camp, 4°20' N, 58°48' W, 150 m. (ROM 108837, 108878), Iwokrama Field Station, 4°41' N, 58°41' W, 70 m. (ROM 115662\*), 'S' Falls, 4°32' N, 59°5' W, 60 m. (ROM 109112\*), Km. 2.8 Mount Daniel Cutline, 4°27' N, 58°46' W (ROM 111905), Sand Stone, 4°23' N, 58°55' W (ROM 111817, 111818); Kaieteur National Park, Kaieteur Falls, 5°10'30" N, 59°28'53" W, 414 m. (ROM 116526\*, 116629, 116657) Menzies Landing, 5°9'59" N, 59°29'34" W, 420 m. (ROM 116573\*); Mount Ayanganna, First Plateau Camp, 5°20' N, 59°57' W, 1100 m. (ROM 114695, 114757); Mount Wokomung, Base of First Escarpment Camp, 5°8'N, 59°49'W, 670 m (ROM 115774), Base of Summit Camp, 5°4' N, 59°52' W, 1420 m (ROM 115916\*); Surama Sawmill, 5 km SE of Surama, 4°6' N, 59° W, 80 m. (ROM 103249\*). Upper Takutu–Upper Essequibo; Cacique Mountain, Kwitaro River, 3°11' N, 58°49' W, 120 m (ROM 113581\*); Kuma River, Kanuku Mountains, 5 miles SE of Lethem, 3°16'N, 59°43'W (ROM 97845); Marurawaunawa, 2°45'N, 59°10'W (ROM 35645\*); Nappi Creek, foot of Kanuku Mountains, 25 km. miles E of Lethem, 3°21' N, 59°34' W (ROM 31561\*, 31604, 31605); Konashen, 1°34' N, 58°41' W (ROM 34437); Unabaiton, 2 km. W of Rupununi River, 2°16'43"N, 59°26'6"W, 150 m (ROM 119157\*). **SURINAME:** Brokopondo; Headquarters, 4°57'N, 55°11'W, 500 m. (ROM 113921\*, 114118), Jeep Trail, 4°56' N, 55°12' W, 500 m. (ROM 114019\*), Irene Falls, 4°55'N, 55°10' W, 240 m (ROM 114215). Commewijne; Nieuwe Grond Plantation, 5°53' N, 54°54' W (CM 63779\*). Marowijne; 3 km. SW Albina, 5°28' N, 54°5' W (CM 77557\*). Nickerie; Avanavero, 4°50' N, 57°14' W (CM 68419\*); Grassalco, 4°46' N, 56°48' W (CM 63780\*); Kabalebo, 4°25' N, 57°13' W (CM 68895\*); Kayserberg Airstrip, 3°6' N, 56°28' W (CM 68897\*); Sipaliwini Airstrip, 2°2' N, 56°8' W (CM 77591\*); 1 km. S, 3.5 km. E Sipaliwini Airstrip, 2°1' N, 56°6' W (CM 63785\*). Para; Zanderij, 5°27' N, 55°12' W (CM 68903\*). Saramaca; Geyskes Creek, Tafelberg, 3°55' N, 56°10' W, 700 m. (CM 76785\*); Lower Geyskes Creek, Tafelberg, 3°56' N, 56°11' W, 600 m. (CM 77585\*); Raleigh Falls, 4°43' N, 56°12' W (CM 63787\*). Sipaliwini; Bakhuis, Transect 7, 4°31'45" N, 56°54'16" W, 110 m. (ROM 117101). **PERU:** Loreto; Requena, Jenaro Herrera, abandoned forestry extraction road, located approximately 1 km. East of the station, 4°54'S, 73°38' W (MUSM 1320). ***Artibeus glaucus*.** **PERU:** Loreto; Alto Amazonas, Pastaza, Ullpayacu, aprox. 5 km. Río Pastaza, 4°34'37" S, 76°35'55" W (MUSM 16369, 16370). Cusco; Paucartambo, Kosñipata, Biological Station Bosque Nublado, San Pedro, 13°03'16" S, 71°32'46" W (MUSM 8761, 11771), Challabamba, Bosque de las Nubes, Carretera Paucartambo-Pillcopata, km. 150, Unión bridge, 13°13'49" S, 71°37'13" W (MUSM 8752); La Convención, Maranura, Hda. Huyro between Huaypata and Quillabamba, 12°58'01" S, 72°36' W (MUSM 274), Echarate, La Convención, Camisea, Cashiriari, 11°49'27" S, 72°49'12" W (MUSM 13691), 2 km. SO de C.N. Tangoshiari, 11°46'47" S, 73°20'26" W (MUSM 13371), Quimbiri, La Convención, Kimbiri, Camp, Llactahuaman, 12°51'53" S, 73°30'46" W (MUSM 14543); Junín, Chanchamayo, San Luis de Shuaro, Yurinaqui Alto, 10°46'58" S, 75°13'01" W (MUSM 279, 1585). ***Artibeus anderseni*.** **PERU:** Loreto; Requena, Jenaro Herrera, 4°55'43" S, 76°35'55" W (MUSM 5525), Ucayali, Contamana, Sierra de Contamana, 7°18.8' S, 74°47.49' W (MUSM 20425). Madre de Dios; Manu, Maskoitania 13.4 km, NNW, Atalaya, 12°46'18.8" S, 71°23'7.68" W (MUSM 19676), Río Palotoa, left bank, 12 km, 12°35'23" S, 71°27'51" W (MUSM 9767).

RECEIVED: June 2012

ACCEPTED: July 2012

PUBLISHED ONLINE: December 2012

EDITORIAL RESPONSIBILITY: Marcelo R. Nogueira